

ES1 INTRODUCTION

The Bureau of Reclamation (Reclamation) is expanding the scope of the San Luis Drainage Feature Re-evaluation (Re-evaluation) to include land retirement among the alternatives for providing drainage service, based in part on public and agency comments. This document is an addendum to the Plan Formulation Report (PFR) published in December 2002. It summarizes changes to the drainage disposal alternatives since December 2002, documents the development of new land retirement alternatives, and describes the additional land retirement alternatives to be evaluated in the Environmental Impact Statement (EIS).

Background

In February 2000, the U.S. Court of Appeals concluded that the Department of the Interior (Interior) must provide drainage service, but held that Interior had the discretion to meet the court order with a plan other than the interceptor drain solution. In accordance with the court order, Reclamation developed a Plan of Action (April 2001; Reclamation 2001a) outlining its proposed efforts to provide prompt drainage service that considers a variety of options.

- The first phase of the Re-evaluation, consistent with the Plan of Action, was the process of identifying a list of preliminary alternatives that meet the court's order to provide prompt drainage service to the San Luis Unit (Unit). The result of the first phase was the *Preliminary Alternatives Report (PAR), San Luis Unit Drainage Feature Re-evaluation*, which was published in December 2001 (Reclamation 2001b). The alternatives described in the PAR meet the court order and use proven technology.
- The second phase of the Re-evaluation was the preparation of the *Plan Formulation Report (PFR), San Luis Drainage Feature Re-evaluation*, which included the determination of the lands that require drainage service; the anticipated quantity and quality of drainwater for which Reclamation will need to provide service; the formulation, evaluation, and screening of the preliminary alternatives; the description of the final set of alternative plans; and identification of a proposed action. The PFR was published in December 2002 (Reclamation 2002).
- The third phase of the Re-evaluation is a refinement of the components of the proposed action, additional engineering design, and completion of the environmental review of the proposed action and alternatives. The products of this phase are the EIS and the Record of Decision.

The 2002 PFR identified the In-Valley Disposal Alternative as the proposed action to provide drainage service. In addition to the In-Valley Disposal Alternative and a No Action Alternative, three action alternatives were included in the PFR:

- Ocean Disposal – Near Point Estero
- Delta-Carquinez Strait Disposal
- Delta-Chipps Island Disposal

Reclamation considered existing ongoing land retirement programs in the 2002 PFR but excluded land retirement as a drainage service component of the Federal drainage service

alternatives at that time because it did not meet the project purpose of “providing drainage service.” Land retirement is a measure that removes land from irrigated agricultural production. However, as a result of public and stakeholder input, Reclamation has determined that it will broaden the scope of analysis to include land retirement as a major component of some of the action alternatives.

ES2 ADDENDUM OVERVIEW AND PURPOSE

Following public review of the PFR, Reclamation and San Luis Unit water contractors agreed that the Re-evaluation should consider land retirement as a component of drainage service alternatives as a means to reduce the overall drainage needs of the Unit. With the decision to include land retirement among the alternatives and with input from stakeholders, Reclamation redefined the project purpose as follows:

The project purpose is to provide agricultural drainage service to the San Luis Unit (the Unit) and the general area, of which lands served by the San Luis Unit are a part, that achieves long-term, sustainable salt and water balance in the root zone of irrigated lands, where drainage service is defined as managing the regional shallow groundwater table by collecting and disposing of shallow groundwater from the root zone and/or reducing contributions of water to the shallow groundwater table through land retirement.

On February 5, 2004, Reclamation submitted to the Court an *Amended Plan of Action for Drainage to the San Luis Unit*. The Amended Plan of Action states that Reclamation will continue to refine and evaluate all five alternatives described in the PFR for inclusion in the EIS:

- No Action
- In-Valley Disposal
- Ocean Disposal
- Two Delta Disposal Alternatives

Additionally, Reclamation will formulate alternative(s) that use land retirement as a method to control drainage need, by comparing costs, benefits, and impacts for alternatives with different amounts of land retirement.

To increase public awareness and solicit input on developing new or modified alternatives and on related environmental analysis issues, Reclamation conducted additional public scoping meetings. In early March 2004, Reclamation conducted scoping meetings (including meetings with stakeholders) at four locations: Sacramento, Concord, Fresno, and Cayucos (Morro Bay). At these meetings, Reclamation outlined its approach to developing land retirement alternatives and requested comments on components of a land retirement alternative and environmental issues and impacts associated with land retirement that should be covered in the EIS.

Scope of Plan Formulation Report Addendum

This addendum focuses on specific alternatives with land retirement: how they were developed, the context in which they were developed, and descriptions of them. The addendum also presents updated estimates of drainage quality and quantity, both with and without land retirement, incorporating updated results of groundwater modeling. Section 5 of this addendum describes all

of the alternatives selected for evaluation in the EIS. For the alternatives carried forward from the PFR, changes that have been incorporated as a result of ongoing analysis are highlighted in the summary descriptions. The land retirement alternatives are presented with sufficient detail to facilitate subsequent comparisons to the other action alternatives in the EIS.

The development of comparable cost data for all of the alternatives is underway but is not presented in this addendum. Land retirement alternatives were formulated utilizing comparable data (environmental, implementation, and cost factors) for the In-Valley Disposal Alternative with and without land retirement. Comparable cost and other data for all alternatives will be presented in the Draft EIS.

Finally, the 2002 PFR identified the In-Valley Disposal Alternative as the proposed action when compared to the No Action and other action alternatives at that time. The focus of this addendum is the formulation and description of additional alternatives incorporating land retirement that will be evaluated in the EIS. Comparable cost data and other analyses are not available for all seven action alternatives, and no analysis or attempt is made in this addendum to either revise or affirm the identification of the proposed action presented in the 2002 PFR. The Draft EIS will describe the proposed action and the other alternatives at a comparable level of detail and analysis.

ES3 STUDY AREA

Lands in the San Luis Unit study area are unchanged from the previous description presented in the PFR (Figure 2-1). The San Luis Unit lands include Westlands Water District (Westlands), and the northern San Luis Unit districts (Northerly Area), which include Broadview Water District, Charleston Drainage District, Pacheco Water District, and Panoche Water District. The total land area within the Unit study area is 689,600 acres. In addition, 40,400 acres of lands contiguous to the northern districts were included in the drainage service analysis because the drainage systems are closely interrelated with the lands in the Unit and Section 5 of the San Luis Act authorizes participation of adjacent lands. The total land area in the Feature Re-evaluation study area is 730,000 acres (Table 2.1-1 in the PFR)

Areas Needing Drainage by 2050

Areas needing drainage service by 2050 were previously evaluated in the PFR. The previous evaluation identified 298,000 acres in Westlands and 45,000 acres in the Northerly Area for a total of 343,000 acres within the San Luis Unit. In addition, the PFR identified an additional 36,000 acres of drainage-impaired lands contiguous to the Northerly Area district lands but outside the Unit for a total of 379,000 acres needing drainage service by 2050. Areas needing drainage service have been revised based on land retirement actions since December 2002. Lands in Westlands needing drainage service were reduced to 253,900 acres for a revised Unit total of 334,900 acres.

Retired Lands

Land retirement is defined as the removal of lands from irrigated agricultural production by purchase or lease for other purposes or land uses. The PFR Addendum updates land retirement for the four existing action alternatives (In-Valley, Out-of-Valley, and two Delta alternatives). In

the 2002 PFR, 10,000 acres are retired (7,000 from the Central Valley Project Improvement Act [CVPIA] land retirement program and 3,000 from the Britz settlement) for the action alternatives, with an additional 68,400 acres retired under No Action from the Westlands Water District (Sagouspe) settlement. This Sagouspe settlement acreage has been revised to 65,000 acres based on revised estimates from Westlands. The PFR Addendum amends this land retirement to include the Sumner Peck settlement lands (34,100 acres) for a total land retirement of 44,100 for the four original action alternatives.

The total area needing drainage service would be reduced further for each of the additional land retirement alternatives. These alternatives are described below in Section ES3 and in Section 3. Table ES-1 shows the estimates of land retirement acreage for the alternatives.

Table ES-1
Land Retirement Program Acreages

	No Action Alternative	Action Alternatives	In-Valley Land Retirement Alternatives
Land Retirement Program	Area (acres)	Area (acres)	Area (acres)
CVPIA Land Retirement Program	7,000	7,000	7,000
Britz Settlement	3,000	3,000	3,000
Sumner Peck Settlement	34,100	34,100	34,100
Westlands Settlement (Sagouspe) ¹	65,000	0	Varies ³
New Alternatives	0	0	48,500 to 263,900
Total	109,100	44,100	92,600 to 308,000²

¹ Sagouspe settlement lands would return to agricultural production when drainage service is provided.

² Land retirement alternatives include lands retired under other programs. See preceding paragraphs.

³ Lands recently acquired by Westlands in 2003 overlap with the other categories of land retirement.

Tile Systems Installed by 2050

In the PFR Reclamation estimated that by 2050 farmers would install field drains on two-thirds of the drainage-impaired lands, or approximately 254,000 acres. This ratio of tile drains to impaired area would be sufficient to address the drainage need. Because the amount of lands needing drainage service in Westlands has decreased due to recent land retirement actions, the total amount of tile drain systems installed by 2050 would also decrease to approximately 218,000 acres in the In-Valley Disposal Alternative. Drain installation would be further reduced in the land retirement alternatives.

ES4 LAND RETIREMENT ALTERNATIVE FORMULATION

As described above, the land retirement analysis in the 2002 PFR included only existing land retirement programs (supplemented with some additional scenarios evaluated in an appendix), and land retirement was not considered as a drainage service action. Responding to requests from stakeholders and interested agencies, Reclamation broadened the evaluation to include varying levels of land retirement in the study area. Reclamation developed, refined, and optimized preliminary alternatives based on specific criteria. The optimization process led to the selection of three land retirement alternatives for evaluation in the EIS. The evaluation process and results

are explained in Section 3. Following is a brief summary of the alternatives development process.

In October 2003, Reclamation began land retirement alternatives development by meeting with project stakeholders to define the parameters that would constitute a complete land retirement program and the range of sizes (acreage) for alternatives. Stakeholders included representatives from San Luis Unit districts (San Luis Water District, Broadview Water District, Westlands Water District, and Panoche Water and Drainage District), San Joaquin River Exchange Contractors Water Authority, and environmental and Delta interests (Environmental Defense, Contra Costa County, Contra Costa Water District). The initial range of alternatives included alternatives based on the following reports and comments provided by the stakeholders:

- Westside Regional Drainage Plan (San Joaquin River Exchange Contractors Water Authority et al. 2003) including lands within Westlands and the Northerly Area.
- U.S. Fish and Wildlife Service comments on the PFR, including an alternative that would retire all drainage-impaired lands in the Unit
- “Drainage Without a Drain” concept proposed by a coalition of environmental groups and local agencies downstream of the San Joaquin Valley,¹

The Project Team refined the initial alternatives developed from the public outreach process to arrive at complete alternatives which include the disposal of any residual drainwater. Factors considered included:

- Amount of land retirement
- Land retirement implementation method
- Future retired land use and ownership
- Future use of water currently used to irrigate land that would be retired
- Extent of drainage reduction measures including irrigation efficiencies and groundwater pumping
- Inclusion of drainage service components necessary to provide a complete disposal alternative

Beginning in December 2003, Reclamation refined the alternatives by determining how the cost, benefit, and potential environmental impacts of the resulting drainage service plan compared to previous alternatives using a variety of modeling and analysis tools. Using an iterative evaluation process, Reclamation considered the following factors for varied levels of land retirement.

- **Improved irrigation efficiency** balanced with deep percolation rates to maintain salt balance in the root zone.
- The **amount of drainage** to be expected under the different land retirement scenarios using the regional groundwater model.

¹ The Bay Institute, Contra Costa County, Contra Costa County Water Agency, Contra Costa Water District, and Environmental Defense.

- Estimated **costs of drainage service** for the land retirement scenarios using engineering cost curves, which calculated the cost for each component of drainage service (e.g., collector system, treatment system, and disposal) for a corresponding drainage rate.
- The **economic benefits** of each scenario to provide another measure to select a final set of alternatives for analysis.
- **Indicators of environmental impact** (such as acres of reuse and evaporation basins needed, or amount of drainwater reclaimed for irrigation) for each scenario.

Reclamation also considered alternatives that targeted the land retirement on areas with high selenium concentrations to identify if such targeting provided significant cost savings compared to other land retirement approaches. Two target levels were suggested: greater than 20 parts per billion (ppb) and greater than 50 ppb selenium in shallow groundwater.

Reclamation used the results of the iterative analysis to identify three land retirement alternatives for evaluation in the EIS. All three assume 10,000 acres would be retired in Broadview Water District in the Northerly Area with the remaining retired lands in Westlands.

All three alternatives are presumed to be variations of the original In-Valley Disposal Alternative (Alternative 4) in the 2002 PFR. The collection, treatment, and disposal of drainwater collected from drained lands would be similar to that described in the 2002 PFR and updated in Section 5.5 for the In-Valley Disposal Alternative, but at a smaller scale.

ES5 DRAINAGE QUANTITY AND QUALITY

Since the PFR, additional investigations into drainwater production, reduction measures, and treatment processes have resulted in revised estimates of drainage quantity and quality.

Drainage Quantity

The PFR concluded that drainwater reduction measures, reuse facilities, and treatment processes could reduce drainwater quantities to be disposed of to evaporation basins to 24,100 acre-feet(AF)/year for the In-Valley Disposal Alternative. Since the PFR, Reclamation has verified and refined drainage modeling estimates with a field-based estimating method using specific estimates of crop patterns and irrigation schedules. Reclamation also determined that additional irrigation efficiencies (reductions in deep percolation to shallow groundwater) would be cost effective and reconfirmed that the drainage reduction measures described in the PFR (seepage reduction, regional recycling, and shallow groundwater management) remain cost-effective. Reclamation also determined that reverse osmosis (RO) treatment of drainwater would be technically feasible and economically viable for all drainage service areas (not just the Northerly Area). With increased irrigation efficiencies and treatment system design improvements, the In-Valley Disposal Alternative would result in 10,600 AF/year requiring disposal to evaporation basins. The In-Valley Alternatives with additional land retirement would result in a range of 4,000 AF/year to 9,200 AF/year needing disposal to evaporation basins.

Drainage Quality

Reclamation developed revised estimates of drainage water quality from farmed lands and reuse areas to enable calculation of discharge water quality for each land retirement and disposal

alternative. The revised estimates will be used in the EIS to evaluate effects on surface- and groundwater resources.

Groundwater quality maps for total dissolved solids, selenium, boron, and molybdenum were developed from well data and used to estimate mean concentrations and uncertainty for each drainage subarea and for reuse areas within the subareas. The salting-up effects of long-term operation of reuse areas on soils and groundwater under the reuse areas were then used to estimate the future quality of drainwater from the reuse areas. The effect of RO and selenium treatment on drainwater quality was estimated using previous performance data. Results of the analysis indicated initial total dissolved solid discharges into evaporation basins ranged from 14,500 to 29,400 milligrams per liter. After 20 to 25 years of operation total dissolved solid concentrations discharged into evaporation basins are expected to increase ranging from 30,000 to 48,000 milligrams per liter. Selenium concentrations discharged into evaporation basins were estimated to be 10 micrograms per liter based on pilot treatment plant performance.

ES6 DESCRIPTION OF DISPOSAL ALTERNATIVES

Section 5 of this addendum focuses on changes to No Action and the four action alternatives discussed in the PFR: In-Valley, Ocean, Delta-Chipps Island, and Delta-Carquinez Strait Disposal Alternatives. It summarizes the three new action alternatives (with additional land retirement).

No Action Alternative

The No Action Alternative defines conditions in the project area through the 50-year planning time frame if drainage service is not provided to the San Luis Unit and related areas. It represents existing conditions for drainage management in 2001 with limited changes in management reasonably expected to occur by individual farmers and districts in the absence of Federal drainage service. These changes would be “the future without the project.”

Land retirement has changed for the No Action Alternative since the 2002 PFR. Land retirement in the PFR included 78,406 acres of retired land; of these, 10,006 acres were assumed to be permanently retired. The revised retired lands include:

- 7,000 acres of CVPIA land retirement (permanent)
- 3,000 acres from the Britz Settlement (*Sumner Peck Ranch, Inc., et al. vs. Bureau of Reclamation et al.*) (permanent)
- 65,000 acres from the Westlands Settlement Agreement (*Sagouspe vs. Westlands Water District*), which could go back into production with the provision of drainage service

An additional 34,100 acres were permanently retired as a result of the Sumner Peck Ranch Settlement of December 2002 and are now included under the No Action Alternative. In summary, 44,100 acres of permanent retirement would be increased by 65,000 acres (Sagouspe settlement) if drainage service is not provided to Westlands, for a total of 109,100 acres (see Table ES-1).

Common Elements to All Action Alternatives

Irrigation System Improvements to Reduce Deep Percolation

Irrigation system changes can reduce the production of subsurface drainage (i.e., reduce drainage rates) by reducing the amount of deep percolation reaching the shallow groundwater in the drainage-impaired area. Updated estimates show that it is cost effective to maintain deep percolation rates at 0.32 foot/year or less in the Westlands drainage-impaired area, and to reduce deep percolation rates by 0.1 foot/year or more in the Westlands upslope areas and in the Northerly Area. The assumption that on-farm irrigation system improvements would be made to enhance irrigation efficiencies was developed for the In-Valley Alternatives analysis. It will be carried forward into the analysis of the Out-of-Valley Alternatives in the Draft EIS.

Drainwater Collection System (In-Valley)

In addition to the closed collection system described in the PFR, the system now would include the Delta-Mendota Canal, which has an earth lining in the Firebaugh area. Reclamation constructed drains in the 1950s to collect shallow groundwater in the vicinity of the earth-lined portion of the canal. The proposed collection system for irrigation drainage service is designed to intercept this groundwater at the existing sumps and convey it to the Northerly Reuse Area for reuse, treatment, and disposal.

Reuse Areas

The PFR described four generalized reuse areas (Northerly Area, Westlands North, Westlands Central, and Westlands South) where the drainwater would be used to irrigate salt-tolerant crops. Each reuse facility would also serve as an underground regulating reservoir to control the flow of reused drainwater to downstream features. At the reuse facilities, subsurface tile drains would be installed to collect the reused drainwater. The reused drainwater would be conveyed via pipeline or canal to treatment and/or disposal facilities.

Currently, up to 16 **regional reuse facilities** are proposed. Drainage quantity and lands required for reuse vary with the alternative. Between 7,500 and 19,000 acres are needed to accommodate the drainage volume of 26,830 to 69,645 AF/year. The final reuse sites are still being refined based upon the service area providing drainwater to each reuse site, field verification and investigation, and review by affected parties.

Several criteria were used to select these potential site locations. Each site is located to take advantage of gravity flows to convey drainwater to the reuse area, without using unduly large pipe sizes. Each site location attempts to make use of some existing retired land. Soil types were important criteria, primarily to avoid heavy clay contents and the low hydraulic conductivity boundary. All sites have been sized to include source control reductions.

Mitigation Measures

All action alternatives would include design features, operating procedures, and other pre- and post-construction measures to minimize potential impacts to significant biological resources, including protected species, important habitats, and natural communities.

Ocean Disposal Alternative

The only difference planned for the Ocean Disposal Alternative is that the aqueduct would collect drainwater from 16 locations near the existing San Luis Drain instead of four, because 16 reuse facility sites are now proposed instead of the four generalized reuse areas.

Delta Disposal Alternatives

The selenium biotreatment process for the two Delta Disposal Alternatives has changed considerably from the PFR. It consisted of a gravity-fed system with a series of five anoxic lagoon cells, an aerated lagoon, a filtration system, and feed tanks and pumps. The lagoons were covered with a floating cover, and the carbon source for the selenium biotreatment was methanol.

As now described in the PFR Addendum, there would be four selenium biotreatment plants, one for each of the drainage areas (Northerly, Westlands North, Westlands Central, and Westlands South). The facility would be constructed for gravity flow through the treatment facility. The facility consists of a modular bioreactor system and accompanying nutrient distribution and flushing system. The primary components of the biotreatment plant consist of a plant feedwater pump, bioreactor cells, nutrient storage tank, nutrient pump, inoculation/flushing storage tank, and flushing pump. This treatment process provides substantial improvement in selenium removal. Selenium treatment is also a component of the In-Valley Alternatives.

In-Valley Disposal Alternative

Reverse Osmosis Treatment

Reused drainwater from all areas would be treated by RO to produce high quality product water that could be blended with Central Valley Project water for use in irrigation. In the PFR, data indicated that RO treatment would be cost effective only in the Northerly Area. Subsequent pilot testing and data collection indicates that RO treatment of drainwater in Westlands is effective, and RO treatment plants would be located near each evaporation basin. Each RO system would consist of a single-stage, single-pass array with appropriate pretreatment to achieve 50 percent recovery.

Filtration of reused drainwater would be the same as described in the PFR with the exception that an injection of a biocide may be required to prevent biological growth in the membrane elements.

Selenium Biotreatment

Discharge (reused drainwater) from the reuse facilities would be treated for selenium removal to reduce the selenium-related impacts associated with evaporation basin disposal. In addition, the concentrate reject stream and RO facilities would also be conveyed to the selenium treatment facilities. In total, there would be four selenium biotreatment plants, one for each of the drainage areas (Northerly, Westlands North, Westlands Central, and Westlands South), using the Applied Biosciences, Inc., technology rather than aerated lagoons described in the 2002 PFR. The proposed facility consists of a modular bioreactor system and accompanying nutrient distribution

and flushing system. Pilot studies of this technology indicate selenium can be reduced to 10 micrograms per liter in the final effluent.

Evaporation Basins

Treated water from the selenium biotreatment plant (at a maximum concentration of 10 micrograms per liter) is then conveyed to evaporation basins for disposal. The PFR described two regional evaporation systems to a total planned acreage of approximately 5,000 acres. Periodic excavation and burial of accumulated salts was likely to be required after 80 to 100 years of operation, and additional basins would have been constructed to replace basins used for the salt burial, if needed.

Several changes have been made to the evaporation basin's design since the PFR, including:

- Wells would be established near each basin site to verify and monitor groundwater conditions before, during, and after evaporation basin installation.
- Basins would be located on existing retired lands where practical.
- Most basins would be surrounded by reuse areas.
- Evaporation basins would consist of sequential evaporation cells that diminish in size as the drainage flows towards the terminal cell where final salt precipitation occurs.
- Basin operational design would include provisions to evacuate individual evaporation basin cells if inflow is not sufficient to maintain a 4-foot minimum depth.

About 16 square miles of land are under investigation for four sites for evaporation facilities. At present with the revised drainage quantities and treatment design improvements, it is estimated that approximately 3,290 acres would be needed in total for the four evaporation facilities: 1,390 in Northerly Area; 1,900 in Westlands North, Central, and South.

Evaporation Basin Mitigation

The PFR described specific mitigation that would be required to reduce and/or compensate for impacts to waterfowl and shorebirds exposed to elevated selenium at the In-Valley Disposal Alternative's proposed evaporation basins. Preliminary concept designs called for development of 3,200 to 6,400 acres of habitat, to be developed at two large mitigation areas. Mitigation acreages at the time were based on application of U.S. Fish and Wildlife Service mitigation protocols for determining alternative and compensation habitat obligations.

Currently, evaporation basin mitigation for the In-Valley Disposal Alternative (and In-Valley/Land Retirement Alternatives) is being reexamined. The size, number, and locations of proposed evaporation basins have changed substantially, and previous estimates of anticipated influent selenium concentrations are now substantially lower. An evaporation basin mitigation strategy will be developed for the EIS following completion of an ecological risk assessment, an evaporation basin bioaccumulation pilot study, and the subsequent reevaluation of the applicability of the current U.S. Fish and Wildlife Service protocols.

In-Valley/Land Retirement Alternatives

The three alternatives range from retiring 92,600 acres to 308,000 acres. The collection, treatment, and disposal of drainwater obtained from remaining drained lands would be similar to these elements of the In-Valley Disposal Alternative, sized to meet the revised drainage quantities.

In-Valley/Groundwater Quality Land Retirement Alternative

This alternative consists of retiring all the lands in Westlands with selenium concentration greater than 50 ppb in the shallow groundwater as well as the (non-overlapping) lands already acquired by Westlands under the Sagouspe settlement. It would also retire 10,000 acres in Broadview Water District in the Northerly Area for a total of 92,600 acres. This alternative would also include irrigation system improvements to reduce deep percolation to shallow groundwater. The irrigation system improvement program would be similar to that described in the 2002 PFR and updated in Section 5.5 for the In-Valley Disposal Alternative (Alternative 4). Lands remaining in production within the drainage-impaired area would be provided drainage service.

In-Valley/Water Needs Land Retirement Alternative

This alternative would retire enough lands to balance internal water use needs of the San Luis Unit (194,000 acres). This total would include all lands with selenium concentrations greater than 20 ppb in Westlands, (non-overlapping) lands already acquired by Westlands, and 10,000 acres in Broadview Water District. The alternative would include irrigation system improvements to reduce deep percolation to shallow groundwater. Lands remaining in production within the drainage-impaired area would be provided drainage service.

In-Valley/Drainage-Impaired Area Land Retirement Alternative

This alternative consists of retiring 308,000 acres, including all the drainage-impaired lands in Westlands – approximately 298,000 acres (including the 44,100 acres retired under other programs). The Northerly Area (non-Westlands) is excluded from land retirement except for 10,000 acres in Broadview Water District, and drainage collection, treatment, and disposal facilities would be avoided in the Westlands drainage-impaired areas. Water made available from this alternative would exceed the agricultural water demand by the remaining lands within the Unit, and would be available for reallocation to other purposes.

